Taranidaphne dufresnei (Mollusca: Gastropoda: Turridae), New Genus and Species from Yemen, Red Sea

MAURO MORASSI

via Valverde, 62 25082 Botticino (BS), Italy; e-mail: mauro.morassi@iol.it

AND

ANTONIO BONFITTO

Dipartimento di Biologia evoluzionistica e sperimentale, via Selmi 3, 40126 Bologna, Italy; e-mail: bonfitto@alma.unibo.it

Abstract. Based on specimens from the Museo di Zoologia dell' Università di Bologna, Taranidaphne dufresnei gen. & sp. nov. is here described from Yemen, Red Sea and Gulf of Aden. The new genus is compared to Taranis Jeffreys, 1870, which it resembles mainly in apertural features. A total of four recent species are at present included in the genus. A redescription of Daphnella (Pleurotomella) amphitrites Melvill & Standen, 1903, and notes on Daphnella (Pleurotomella) nereïdum Melvill & Standen, 1903, species assigned to the new genus and originally described from the Gulf of Oman, are included. Bela erythraea Jousseaume, 1895, from Atacka, Suez, Red Sea, is here regarded as a synonym of Pleurotoma (Bela) hongkongensis Sowerby, 1888, from Hong Kong, a species also referred to Taranidaphne. The lectotype and a paralectotype of Bela erythraea are figured. A lectotype for Daphnella (Pleurotomella) amphitrites is designated and figured; syntypes of Pleurotoma (Bela) hongkongensis and Daphnella (Pleurotomella) nereïdum are figured for the first time.

INTRODUCTION

During the examination of turrid samples dredged by the French oceanographic ship *Marion Dufresne* offshore Yemen, Red Sea and Gulf of Aden (Red Sed '92 European Community Project, September 1992, Gulf of Aden and South Red Sea) few adult specimens and several fragments of *Daphnella (Pleurotomella) amphitrites* Melvill & Standen, 1903, and a very distinctive, unknown turrid species were found. These species prove to belong to an undescribed, widely distributed genus represented by a few species.

In this paper the traditional classification of the family Turridae is used rather than that proposed by Taylor et al., 1993. Although this proposed classification is the first largely based on anatomical characters, Rosenberg (1998) has recently demonstrated that their results cannot be reproduced.

Abbreviations: a/1 = ratio of aperture length to total shell length; b/1 = ratio of shell breadth to total length; BMNH = The Natural History Museum, London; HUJ = Hebrew University, Jerusalem; MNHN = Musèum National d'Histoire Naturelle, Paris; MZB = Museo di Zoologia dell'Università di Bologna; NMSA = Natal Museum, Pietermaritzburg.

TAXONOMY

Family Turridae H. & A. Adams, 1853 Subfamily Daphnellinae Deshayes, 1863 Genus *Taranidaphne* Morassi & Bonfitto, gen. nov.

Type species: Taranidaphne dufresnei, sp. nov.

Description: Shell thin and small (up to 8 mm in length), fusiform-biconic to broadly-biconic in shape, teleoconch with a small to intermediate number of rapidly expanding whorls, apex acute, last whorl large and inflated. Whorls often distinctly shouldered/keeled. Suture deep. Subsutural ridge present, often bisected by a groove, with laterally projecting nodules. Aperture lanceolate to oblanceolate. Parietal wall gently convex. Columella convex at base. Labial callus very thin or absent. Outer lip thin, devoid of denticles, not preceded by a labral varix. Stromboid notch absent or very slight. Anal sinus resembling that of Taranis, i.e., very shallow and broad, with its apex on periphery. Siphonal canal very short and broad, poorly differentiated from aperture and lacking a terminal notch. Base moderately concave on left side. Sculpture consisting of collabral axial ribs, rather straight below periphery, prosocline above it, crossed by sharply incised spiral ridges to form axially aligned nodules. Interstices quadrangular in shape. Protoconch multispiral or paucispiral, with diagonally cancellate sculpture or granulose spiral threads. Teleoconch translucent white; protoconch yellowish in fresh specimens.

Discussion: Taranidaphne superficially resembles Taranis Jeffreys, 1870, a very widely distributed genus (Kilburn, 1991; Powell, 1967), recently referred to the monotypic subfamily Taraninae Casey, 1904 (Kantor & Sysoev, 1989; Taylor et al., 1993). These genera have the same number of teleoconch shell whorls, type of anal sinus (very shallow and broad, with its apex on periphery) and other apertural features (length of siphonal canal, absence of ornament on the outer lip and columella). However, Taranidaphne bears a strongly developed sculpture of sharply incised spiral ridges which cut collabral axial ribs to form conspicuous axially elongated squares with quadrangular interstices. In Taranis the sculpture is much fainter, consisting of imbricate axial riblets/lamellae crossed by spiral lirae to form at most minute nodules. Taranidaphne further differs from most species allocated in Taranis in possessing a thicker, more produced, and less excavated base. The species included in the new genus are larger than those of Taranis, which are minute, with most species not exceeding 4.6 mm in maximum length.

Under SEM, the examined species of *Taranidaphne* proved to be devoid of the microscopic granules which are typically present in *Taranis* (Bouchet & Warén, 1980; Kilburn, 1991). Finally, whereas the shell of *Taranis* is frequently colorless, that of the new genus is often bicolored (crystalline white teleoconch, yellowish protoconch).

The Atlantic bathyal *Taranis malmi* (Dall, 1889) bears a protoconch which closely resembles that of *Taranida-phne*, being multispiral and diagonally cancellate (Bouchet & Warén, 1980). However, due to its high spire and very different apex, its position within *Taranis* has been questioned by Kilburn (1991), who suggested the German Miocene daphnelline genus *Magnella* Dittmer, 1960, as a better option. The present authors have not studied the type species of the latter but, judging from the description and figure given by Powell (1966), consider this possibility reasonable. However, *Taranidaphne* differs widely from *Magnella* in its much lower spire, strongly inflated body whorl, absence of microscopic spirally aligned granules and cytharidlike axials on teleoconch whorls.

Apart from the species described below, the new genus at present includes: *Daphnella (Pleurotomella) amphitrites* Melvill & Standen, 1903, *D. (Pleurotomella) nereidum* Melvill & Standen, 1903, two deep-water taxa described from the Gulf of Oman, and *Pleurotoma (Bela) hongkongensis* Sowerby, 1888, from Hong Kong, China Sea (=*Bela erythraea* Jousseaume, 1895 from Atacka, Suez, Red Sea).

Presently, the authors, in the absence of anatomical evidence and despite a superficial resemblance to *Taranis*

in apertural features, prefer to allocate the new genus to the subfamily Daphnellinae rather than Taraninae. The presence within *Taranidaphne* of species with a diagonally cancellate protoconch, a character currently considered diagnostic of Daphnellinae (Powell, 1966; Taylor et al., 1993) is consistent with the proposed assignment.

It should be noted that Taylor et al., 1993 conserve the monotypic subfamily Taraninae Casey, 1904, only with doubt because *Taranis* differs considerably in shell characters from any other turrid group lacking a radula. However, both *Magnella* and *Taranidaphne* so closely approach *Taranis* in several shell characters that a profound taxonomic distinction based solely on shell characters would certainly be rather doubtful.

Range: Red Sea, Gulf of Aden, Gulf of Oman, and China Sea.

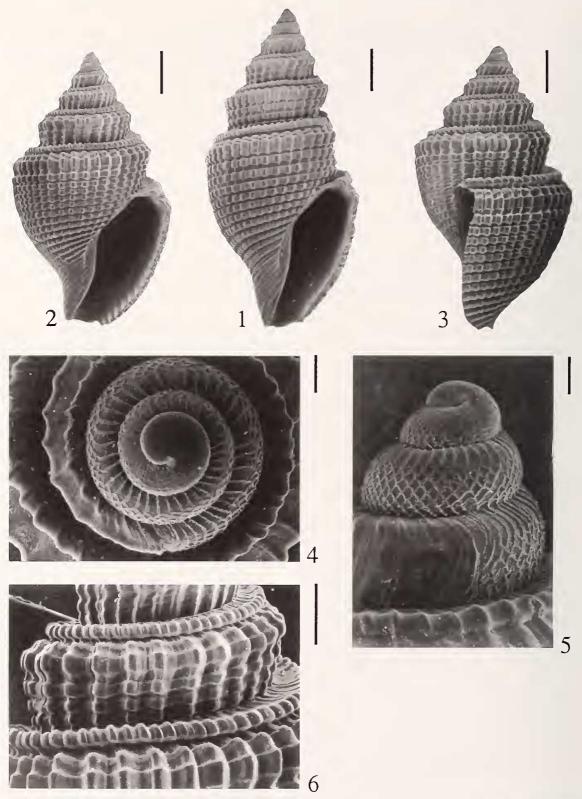
Etymology: from *Taranis* + *Daphnella*, gender feminine. Referring to the resemblance to these genera in apertural features and protoconch respectively.

Taranidaphne dufresnei Morassi & Bonfitto, sp. nov.

(Figures 1-6)

Diagnosis: Shell up to 6.5 mm in length, fusiform-biconic to broadly biconical. Teleoconch whorls strongly shouldered above median, sculptured by deeply incised spiral ridges crossing narrower collabral axial ribs forming squares. Sutural channel very wide and deep. Aperture oblanceolate. Siphonal canal very short. Anal sinus broad and shallow. Color white; protoconch yellowish. Protoconch of 3–3.5 whorls, with diagonally cancellate sculpture.

Description: Shell small, thin, fusiform-biconic to broadly biconical with orthoconoid spire, acute apex and large, inflated last whorl. Base well produced, curving only slightly to left. Teleconch consisting of 4.25-5 rapidly expanding whorls, strongly and angularly shouldered above mid whorl. Sutural channel very wide and deep. Left side of base concave, without fasciole. Aperture broad, oblanceolate, with greatest width at posterior third, slightly bent at siphonal canal. Parietal wall slightly convex, columella gently convex. Labial callus a thin glaze. Outer lip very thin, devoid of denticles and not preceded by a labial varix. Siphonal canal short and broad, poorly differentiated from aperture with its termination slightly obliquely truncate, lacking a terminal notch. Anal sinus very shallow and broad with its apex on periphery. Stromboid notch absent. Sculpture consisting of flattopped spiral ridges with deeply incised and narrower to subequal intervals crossing thin axial ribs to form strong, axially elongated squares. Axials narrower than their intervals, rather orthocline below the shoulder angulation, forming raised and prosocline plicules on sutural channel.



Figures 1–6. *Taranidaphne dufresnei* Morassi & Bonfitto, sp. nov. Figure 1. Holotype, MZB 12913; scale bar 1 mm. Figures 2, 3. Paratype from Gulf of Aden, MZB 12914; scale bar 1 mm. Figures 4, 5. Protoconch, MZB 12918; scale bar 100 μm Figure 6. Teleoconch whorls, MZB 12914; scale bar 500 μm.

First teleoconch whorl with a narrowly channelled suture, a subsutural lira, and a peripheral keel above mid whorl, crossing axials to form laterally projecting nodules. Second whorl with a distinct subsutural ridge bearing axially elongated, coglike nodules, a stronger keel, and two spiral ridges anteriorly. At this stage, the axial ribs have almost completely been cut into elongated squares, while the sutural channel has become very wide and distinctly concave, the shoulder slope reduced to a narrow, deep groove between the previous subsutural ridge and the periphery. On the third whorl the shoulder keel has a primary row of squares, and, according to specimens, a much weaker row adapically, or one row on either side of it. Below the keel, there are three spiral ridges on this and the subsequent whorl; four to five on the last whorl. Body whorl with 35-46 axial ribs evanescing below periphery. Base of body whorl with 13-16 spiral ridges, interstices much narrower than spirals. Teleoconch translucent white; protoconch yellowish (in fresh specimens). Protoconch multispiral, conical, consisting of 3-3.5 strongly convex whorls; the first small and rounded, covered with minute spiral threads cutting finer axial threads, giving a somewhat reticulate appearance; subsequent whorls with about 80 opistocyrt axial riblets crossed by oblique threads to form a diagonal cancellation resulting in numerous lozenges on 75% of the whorl. Under SEM, the surface is seen to bear dense, divaricating spiral microstriae. Protoconch diameter: 0.40-0.45 mm.

Measurements (in mm):

	Length	Breadth	Aperture	b/l	a/l
Holotype	6.5	3.2	3.0	0.49	0.46
Paratypes	4.8–6	2.5-3.4	2.5–3	0.52-0.57	0.50-0.52

Type locality: Offshore Yemen, Red Sea (14°46′72″N, 42°32′82″E), 76 m depth on muddy sand.

Type material: Four adult specimens (bored), three luvenile, and 14 fragments from the type locality; two adult specimens from Gulf of Aden (12°02′36″N, 44°29′53″E), 1400 m depth.

Holotype: MZB 12913

Paratypes: Two from Gulf of Aden MZB 12914–15, 16 from Red Sea MZB 12916–31; one BMNH; one HUJ, MNHN; one NMSA.

Etymology: Named after the French oceanographic ship, *Marion Dufresne*, which dredged the available material.

Discussion: *Taranidaphne dufresnei* sp. nov. differs distinctly from other members of the genus, notably in the presence of strong axially elongated squares, a very wide sutural channel, and a not bisected subsutural ridge.

Two forms of this distinctive species occur, namely a

fusiform-biconic one and a shorter, more biconical morph. Apart from the difference in teleoconch shape, the latter differs from the former in possessing a half whorl more in the protoconch and fewer teleoconch whorls (about 4.25 instead of 5). Such variability is presumably not depth-related because both forms occurred at the same station (14°46′72″N, 42°32′82″E), but is probably indicative of dimorphism within the species.

The broad morph of *T. dufresnei* may resemble some species allocated in the widely distributed daphnelline genus *Mioawateria* Vella, 1954. However, members of that genus are even more broadly biconical in shape, with a lower spire and a thicker shell.

We are inclined to consider the occurrence of *Taranidaphne dufresnei* at 1400 meters depth (12°02′36″N, 44°29′53″E) as merely accidental, the result of transport from the continental shelf.

Taranidaphne amphitrites (Melvill & Standen, 1903), comb.nov.

(Figures 7–11, 12)

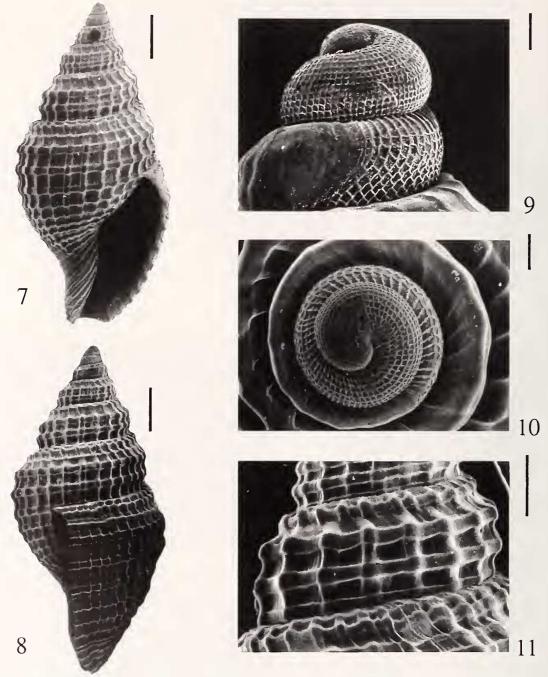
Daphnella (Pleurotomella) amphitrites Melvill & Standen, 1903:316, pl. XXIII, fig. 3.

Type locality: Gulf of Oman, 24°58'N, 56°54'E, 156 fathoms.

Pleurotomella amphitrites (Melvill & Standen), Melvill, 1917:196.

Diagnosis (Yemen specimens): Shell up to 6.8 mm in length, fusiform-biconic. Teleoconch whorls not distinctly shouldered or keeled, sculptured by deeply incised spiral ridges crossing collabral axial ribs forming nodules. Suture narrowly channelled, subsutural ridge bisected by a groove. Aperture somewhat lanceolate. Siphonal canal very short. Anal sinus broad and shallow. Color white; protoconch yellowish. Protoconch papilliform of two whorls, with diagonally cancellate sculpture.

Description (Yemen specimens): Shell small, thin, fusiform-biconic with a rather acute, orthoconoid spire and inflated body whorl. Base well produced curving strongly to left. Teleoconch whorls about five with deep, narrowly channelled suture. Whorls convex, not distinctly shouldered or keeled. Left side of base moderately convex. Aperture somewhat lanceolate with greatest width at posterior third, moderately strongly bent at siphonal canal. Parietal wall moderately convex. Columella sinuous and convex, narrow and acuminate anteriorly. Labial callus absent. Outer lip thin, very convex, devoid of denticles, not preceded by a labial varix. Siphonal canal poorly differentiated from aperture, not deeply notched. Anal sinus almost imperceptible, with its apex on periphery. Stromboid notch feeble but present. Sculpture consisting of flattopped spiral ridges with deeply incised and much broader intervals crossing thin axial ribs to form small, axially aligned nodules. Axials equal to intervals or half their



Figures 7–11. Taranidaphne amphitrites (Melvill & Standen, 1903). Figures 7, 8. Specimen from Yemen (Red Sea), MZB 12932; scale bar 1 mm. Figures 9, 10. Protoconch, MZB 12937; scale bar 100 μ m. Figure 11. Teleoconch whorls, MZB 12933; scale bar 500 μ m.

width, rather straight below the peripheral ridge, arcuate and prosocline above it. Interstices broad, quadrangular. First teleoconch whorl with a nodulous subsutural lira, a peripheral keel, and a weaker ridge anteriorly. Subsequent whorls with a bisected subsutural ridge rendered nodulous by axial ribs, two main spiral ridges, and a weaker one just above the abapical suture. Body whorl with one spiral lira on shoulder slope and, according to specimen, one spiral lira in each interval between the three main ridges. Body whorl with 30–33 axial ribs, evanescing at level of

parietal-columellar junction. Base of body whorl with 15–16 spirals with narrower intervals. Teleoconch translucent white, protoconch yellowish (in fresh specimens). Protoconch papilliform of two whorls; first tilted and covered with minute and dense spiral threads crossed by finer axial threads, giving a reticulate appearance; subsequent whorl developing a diagonally cancellate sculpture of opisthocyrt axials crossed by oblique riblets in abapical two-thirds of the whorl. Protoconch diameter: 0.36–0.45 min.

Measurements (in mm):

	Length	Breadth	Aperture	b/1	a/l
Specimen 1	6.1	2.9	3.1	0.48	0.51
Specimen 2	6.8	3.3	3.4	0.49	0.50
Specimen 3	6.4	3.3	3.3	0.52	0.52

Material examined: Two syntypes of *Daphnella (Pleurotomella) amphitrites* in BMNH (reg. no 1903.12.15.40–41), one marked with a red dot is most probably the figured specimen and is here designated as lectotype, 6.8×3.2 mm.; three adult specimens (MZB 12932–34), two juveniles (MZB 12935–36), and eight fragments (MZB 12937–44) from Yemen, Red Sea (14°46′72″N, 42°32′82″E), 76 m depth on muddy sand.

Remarks: The available material has been identified as Daphnella (Pleurotomella) amphitrites Melvill & Standen, 1903, after comparison with the two syntypes of the species stored in BMNH. Taranidaphne amphitrites much more closely resembles Taranidaphne hongkongensis (Sowerby, 1888) than any other member of the genus. The only significant difference we can define is the protoconch sculpture which in T. hongkongensis is of granular spiral threads, whereas in T. amphitrites it is diagonally cancellate.

Taranidaphne nereidum (Melvill & Standen, 1903), comb. nov.

(Figure 13)

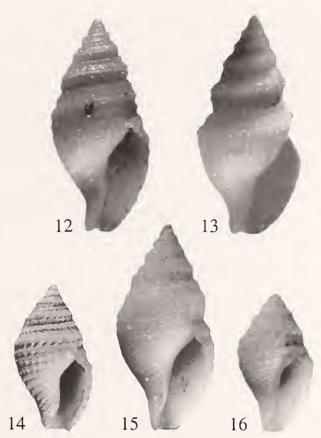
Daphnella (Pleurotomella) nereïdum Melvill & Standen, 1903:315, pl. XXIII, fig. 2.

Type locality: Gulf of Oman, 24°58′N, 56°54′E, 156 fathoms.

Pleurotomella nereïdum (Melvill & Standen), Melvill, 1917: 197.

Material examined: Two syntypes of *Daphnella (Pleu-rotomella) nereïdum* stored in BMNH (reg.no. 1903.12.15.83).

Notes: Shell small and thin, biconic with orthoconoid spire, acute apex, and inflated body whorl. Base well produced curving distinctly to left. Teleoconch consisting of 5.25 rapidly expanding whorls strongly angulated at mid whorl by a keel. Suture deep, narrowly channelled. Left side of base deeply concave, without fasciole. Aperture



Figures 12–16. Figure 12. Lectotype of *Daphnella (Pleurotomella) amphitrites* Melvill & Standen, 1903, BMNH 1903.12.15.40. Figure 13. Syntype of *Daphnella (Pleurotomella) nereidum* Melvill & Standen, 1903, BMNH 1903.12.15.83. Figure 14. Syntype of *Daphnella (Pleurotomella) hongkongensis* Sowerby, 1888, BMNH 1889.2.1.9–10. Figures 15, 16. Lectotype and paralectotype of *Bela erythraea* Jousseaume, 1895, MNHN.

broad oblanceolate, with greatest width at posterior third, strongly bent at siphonal canal. Parietal wall convex, columella strongly convex. Labial callus absent. Outer lip thin, devoid of denticles, not preceded by a labral varix. Siphonal canal short, with its termination obliquely truncate, lacking a notch. Anal sinus almost imperceptible, with its apex on peripheral keel. Shoulder slope strongly declivous. Sculpture consisting of thin, collabral axial ribs, narrower than their intervals, crossed by spiral ridges, of which the peripheral one forms a prominent keel, to form axially aligned squares. Peripheral keel at onethird of whorl below the suture on early teleoconch whorls, median on latter. First teleoconch whorl with a very feeble subsutural lira and the peripheral lira crossed by axials to form nodules. Subsequent whorls with two main spiral ridges below the median keel. Subsutural ridge distinctly bisected. Penultimate whorl with a bisected subsutural ridge, two spiral threads on shoulder slope, a well developed peripheral keel, and two main spiral ridges anteriorly. Body whorl with 19 spiral ridges, 12 of which are on base. Protoconch conical, multispiral of three diagonally cancellate whorls. Length: 6.5 mm; breadth: 3 mm (figured syntype).

Remarks: Taranidaphne nereidum is readily distinguished from its congeners by its keeled whorls, pagodiform spire, and absence of a strongly developed fenestrate sculpture. From **Taranidaphne** hongkongensis and T. amphitrites it further differs in its multispiral protoconch.

Although Melvill (1917) considered it very similar in ornamentation and shape to the Australian species *Daphnella vestalis* Hedley, 1903, the latter is rather different and has been referred to genus *Asperdaphne* (Laseron, 1954; Powell, 1966).

Taranidaphne hongkongensis (Sowerby, 1888), comb.nov.

(Figures 14-16)

Pleurotoma (Bela) hongkongensis Sowerby, 1888: 567, pl.28, fig. 16. Type locality: Hong Kong

Bela erythraea Jousseaume, 1895:47. (new synonymy). Type locality: Atacka, Suez, Red Sea.

Taranis erythraeus (Jousseaume), Kilburn, 1991: 338, figs. 20–21.

Material examined: Two syntypes of *Pleurotoma* (*Bela*) *hongkongensis* stored in BMNH (reg. no 1889.2.1.9-10); lectotype and 10 paralectotypes of *Bela erythraea* in MNHN.

Remarks: Having examined the two syntypes of P. (Bela) hongkongensis and the type material of Bela erythraea Jousseaume, 1895, we consider these two to be synonyms. The two probably juvenile specimens of P. (Bela) hongkongensis (5.2 \times 2.9 mm; 4.6 \times 2.3 mm) agree remarkably well with the type series of B. erythraea, but superficially differ in having a slightly broader, globose protoconch (0.43-0.47 mm vs. 0.41 mm), fewer spiral lirae on the base (11-12 versus 12-15), and a strongly developed, nodulous subsutural ridge. Actually, these differences do not stand up to close scrutiny. In the largest specimen of T. hongkongensis the base is clearly damaged, so that the observed number of lirae (11) is only indicative. Furthermore, even within the type series of Bela erythraea there are considerable individual differences in the strength of the subsutural ridge, so that too much attention should certainly not be paid to this

character. We also assume that the very slight difference in protoconch breadth alone is rather inadequate to warrant a taxonomic distinction, even at the subspecific level.

Acknowledgments. The authors wish to thank to Dr. R. N. Kilburn of the Natal Museum, Pietermaritzburg, South Africa. Type specimens were kindly loaned by Ms. Virginie Heros (MNHN) and Ms. Kathie Way (BMNH).

LITERATURE CITED

- BOUCHET, P. & A. WARÉN. 1980. Revision of the North-East Atlantic bathyal and abyssal Turridae (Mollusca: Gastropoda). Journal of Molluscan Studies, Supplement 8:1–118.
- JOUSSEAUME, F. P. 1895. Description d'un mollusque nouveau. Le Naturaliste [2] 9:147.
- KANTOR, Y. I. & A. V. SYSOEV. 1989. The morphology of toxoglossan gastropods lacking a radula, with a description of a new species and genus of Turridae. Journal of Molluscan Studies 55 (4):537–549.
- KILBURN, R. N. 1991. Turridae (Mollusca: Gastropoda) of southern Africa and Mozambique. Part 5. Subfamily Taraninae. Annals of the Natal Museum 32:325–339.
- LASERON, C. F. 1954. Revision of the New South Wales Turridae. Royal Zoological Society of New South Wales Handbook: 1–56, pls. 1–12.
- MELVILL, J. C. 1917. A Revision of the Turridae (Pleurotomidae) occurring in the Persian Gulf, Gulf of Oman and North Arabian Sea, as evidenced mostly through the results of dredgings carried out by Mr. F. W. Townsend, 1893–1914. Proceedings of the Malacological Society of London. 12: 140–201, pls 8–10.
- MELVILL J. C. & R. C. STANDEN. 1903. Descriptions of sixty-eight new gastropods from the Persian Gulf, Gulf of Oman and North Arabian Sea, dredged by Mr F. W. Townsend of the Indo-European Telegraph Service 1901–1903. Ann. Mag. Nat. Hist. [7] 12:289–324, pls 20–23.
- Powell, A. W. B. 1966. The molluscan families Speightiidae and Turridae. Bulletin of the Auckland Institute and Museum 5: 1–184, pls 1–23.
- Powell, A. W. B. 1967. The family Turridae in the Indo-Pacific. Part 1a. The subfamily Turrinae concluded. Indo-Pacific Mollusca 1 (7):409–431.
- ROSENBERG, G. 1998. Reproducibility of results in phylogenetic analysis of mollusks: a reanalysis of the Taylor, Kantor and Sysoev (1993) data set for conoidean gastropods. American Malacological Bulletin 41 (2):219–228.
- SOWERBY, G. B. III. 1889. Descriptions of fourteen new species of shells from China, Japan and the Andaman Islands, chiefly collected by Deputy Surgeon-Gen. R. Hungerford. Proceedings of the Zoological Society 1888:565–570, pl. 28.
- TAYLOR, J. D., Y. I. KANTOR & A. V. SYSOEV. 1993. Foregut anatomy, feeding mechanisms relationship and classification of the Conoidea (=Toxoglossa) (Gastropoda). Bulletin of the Natural History Museum (Zoology) 59 (2):125–170.